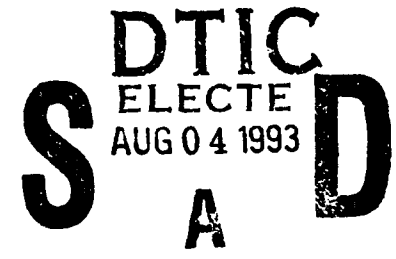

OFFICE OF NAVAL RESEARCH

QUARTERLY REPORT

for

1 April 1993 through 30 June 1993

GRANT No. : N00014-89-J-1754

THE EFFECTS OF MAGNETIC STORM PHASES ON F-LAYER IRREGULARITIES FROM AURORAL TO EQUATORIAL LATITUDES

Jules Aarons and Michael Mendillo, Co-Principal Investigators

Boston University
Center for Space Physics
Boston, MA 02215

ATTENDANCE AT THE TRANS-EQUATORIAL AND NEAR EQUATORIAL RADIO PROPAGATION CONFERENCE

Sponsored by the U.S. Navy, a conference was held at the Naval Post- Graduate School in Monterey, California; it was attended by J. Aarons. After some excellent reviews on equatorial physics, sessions were held devoted to radio propagation problems. In particular we were asked to work on forecasting and prediction from the viewpoint of giving field operations more relevant information on HF. The problem of the ionosphere's effect on the Global Positioning System was discussed (rather briefly, I felt) and there were papers on scintillation studies as they affected military satellite communications. The abstract shown in the last quarterly report on Day-to-Day Variations in Equatorial Irregularities was supplemented in the presentation at the conference by the full paper. We view the state of our studies of the day-to-day problem as work in progress rather than final results.

AASERT PROGRAM IN UPPER ATMOSPHERE AND IONOSPHERIC PHYSICS

The ASSERT graduate fellowship recently awarded to Boston University will be used to support Ms. Marlene Colerico, a new graduate student in the M.S. in Engineering Program, who will be a Research Assistant working with Professors Mendillo and Aarons in the Center for Space Physics. Ms. Colerico will start in August 1993, working on the latitude-altitude mapping of airglow depletions in the equatorial region and their comparison with coherent backscatter from plasma irregularities observed by incoherent scatter radar.

EQUATORIAL STUDIES

We continued with the comparison of scintillation and total electron content data from a chain of stations in the Pacific. The study compares TEC and scintillation data for Manila, the Philippines, Palehua, Hawaii, Lunping, Taiwan, and Osan, Korea. Three of the stations, Manila, Lunping, and Osan are spaced along a narrow range of longitudes. For some periods in 1980 and 1981, all the data are available. The data set for June and July 1980 and 1981 have been reduced and are being studied. The data present many problems. It was assumed than an equatorial plume extending well over 1500 km in altitude would be effective in the anomaly region 15 to 20 degrees from the equator. What is puzzling is that there are effects (scintillations and fluctuations in Faraday rotation) that appear over several hours with no activity reported from the site near the magnetic equator (Manila). This might be due to the high electron content in the Osan region plus the sensitivity of its propagation angle. Further studies are needed to resolve this issue.

THE ONR SPONSORED ALL-SKY IMAGER

The new all-sky imager to be operated in Goose Bay, Labrador, in conjunction with radar and optical diagnostics at Millstone Hill (MA), is nearing completion. All parts being made at the B.U. Machine Shop are on schedule for completion in August, and other (purchased) components are either in hand, or will be delivered in the same time frame. Fabrication and testing will be completed in early Fall, with installation and initial operation schedule for late Fall-early Winter 1993.